Withrow & Terranova

RECEIVED
CENTRAL FAX CENTER
MAY 04 2006

Professional Limited Liability Company

Attorneys At Law
Registered Patent Attorneys

A High Technology Patent Practice

FACSIMILE TRANSMITTAL SHEET

TO: Examiner Dzung D. Tran	FROM: Benjamin S. Withrow
COMPANY: USPTO – Art Unit 2638	DATE: 5/4/2006
FAX NUMBER: 571-273-8300	TOTAL NO. OF PAGES INCLUDING COVER: 36
PHONE NUMBER:	SENDER'S REFERENCE NUMBER: 7000-431
RE: Appeal Brief	YOUR REFERENCE NUMBER: 09/580,495

☐ URGENT ☐ FOR REVIEW ☐ PLEASE COMMENT ☐ PLEASE REPLY ☐ ORIGINAL TO FOLLOW

NOTES/COMMENTS:

Please find attached the following item(s):

1) Appeal Brief (34 pages);

2) Credit Card Payment Form for $500.00 (1 page).

201 SHANNON OAKS CIRCLE, SUITE 200
CARY, NC 27511
PH: (919) 654-4520
FAX: (919) 654-4521

RECEIVED
CENTRAL FAX CENTER
MAY 04 2006

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Application of: Alan F. Graves et al.
Serial No. 09/580,495
Filed: 05/30/2000
For: **OPTICAL SWITCH WITH POWER EQUALIZATION**

Examiner: Tran, Dzung D.
Art Unit: 2638

Mail Stop Appeal Brief – Patents
Commissioner for Patents
PO Box 1450
Alexandria, VA 22313-1450

Sir:

An **APPEAL BRIEF** is filed herewith. Appellant also encloses a credit card form authorizing payment in the amount of $500.00 as required by 37 C.F.R. § 1.17(c). If any additional fees are required in association with this appeal brief, the Director is hereby authorized to charge them to Deposit Account 50-1732, and consider this a petition therefor.

APPEAL BRIEF

(1) REAL PARTY IN INTEREST

The real party in interest is the assignee of record, i.e., Nortel Networks Limited of 2351 Boulevard Alfred-Nobel, St. Laurent, Quebec Canada H4S 2A9, which is wholly owned by Nortel Networks Corporation, a Canadian corporation.

(2) RELATED APPEALS AND INTERFERENCES

There are no related appeals or interferences to the best of Appellant's knowledge.

(3) STATUS OF CLAIMS

Claims 1-3, 15, 16, 19-24, and 58 were rejected with the rejection made final on November 16, 2005.

Claims 4-14, 17, 18, and 25-57 were previously withdrawn in response to a restriction requirement. Appellant has reserved the right to file one or more divisional applications claiming these claims.

Claim 59 has been canceled.

Claims 1-3, 15, 16, 19-24, and 58 are pending and are the subject of this appeal.

05/05/2006 SSITHIB1 00000073 09580495
01 FC:1402 500.00 OP

(4) STATUS OF AMENDMENTS

All amendments have been entered to the best of Appellant's knowledge.

(5) SUMMARY OF CLAIMED SUBJECT MATTER

The present invention is directed to providing each signal at the output of a photonic switch with a controllable (e.g., flat) optical power spectrum. The equalizer of the invention controllably adjusts the optical power of each individual optical signal passing through the photonic switch by placing a plurality of variable optical intensity controllers (VOICs) in each optical path prior to wavelength recombination. The VOICs can be variable optical amplifiers or variable optical attenuators. The VOICs are controlled by a controller that derives power estimates from individual optical carrier signals extracted from the wavelength division multiplexed (WDM) signals at the output of the photonic switch.

Claim 1 is directed to an optical intensity control system for use with an optical switch (such as photonic switch 400, Figure 4) providing individual signal paths (such as the demuxed switched optical paths 180 in Figure 4) between a plurality of input ports and a plurality of output ports (such as the input ports and output ports of optical switch matrices 150a-150n in Figure 4). The optical switch has a plurality of wavelength division multiplexers 130a-130n (Figure 4) for combining sets of individual switched optical signals into multiplexed switched optical signals. Each of the optical switch matrices 150 a-150n has a total of K+N input ports, where each of the N input ports is connected to the like-wavelength output port of a respective one of the wavelength division demultiplexing (WDD) devices 110a-110n (Figure 4), while each of the N output ports will be connected to the like-wavelength input port of a respective one of the WDM devices 130a-130n (Figure 4).

The inventive optical intensity control system of claim 1 comprises:

a plurality of optical splitters (such as element 420 in Figure 4), each optical splitter being connectable to an output of a respective one of the plurality of wavelength division multiplexers (Figure 4; Specification, p. 25, line 1 through p. 26, line 2);

a plurality of variable optical intensity controllers (VOICs) (Element 410 in Figure 4) for insertion into respective ones of the individual signal paths and for individually controlling the intensity of optical signals present in said respective ones of the individual signal paths in accordance with respective intensity control signals (Specification, p. 23, lines 1-31); and

an equalizer (Element 500, Figures 4-9) connected to the plurality of optical splitters and to the plurality of VOICs, for producing an estimate of optical power of each individual switched optical signal and generating the intensity control signals as a function of the estimates of optical power (See Figures 4-9; Specification, p. 16, line 15 through p. 17, line 4; p. 17, line 24 through p. 18, line 17; p. 26, line 4 through p. 27, line 10).

Claim 15 is directed to a method of generating control signals for adjusting intensity of single-carrier optical signals travelling through an optical switch adapted to recombine groups of switched optical signals into multiplexed switched optical signals at an output end of the optical switch (see Specification, p. 19, line 31 through p. 20, line 12, and Figure 4). The method includes the steps of: (a) controllably isolating individual switched optical signals from the multiplexed switched optical signals (Specification, p. 18, lines 1-5 and lines 12-17; p. 19, lines 4-17; p. 19, line 31 through p. 20, line 12; p. 29, line 28 through p. 30, line 3); (b) estimating the power of the individual switched optical signals isolated at step (a) (Specification, p. 15, line 31 through p. 16, line 2; p. 17, lines 24-31; p. 18, lines 9-17; p. 20, lines 8-9; see also power estimation modules 530 in Figures 5-8); and (c) generating the control signals as a function of power estimates obtained at step (b) and a reference value (see Specification, p. 18, lines 12-17; p. 20, lines 10-12; p. 29, lines 20-24; p. 33, lines 23-27; p. 39, lines 27-31; p. 40, lines 15-17; p. 42, line 23 through p. 44, line 10; see, e.g., processor 554 in Figure 5) .

Claim 19 is directed to an equalizer for generating control signals used in adjusting the intensity of single-carrier optical signals travelling through an optical switch adapted to recombine groups of individual switched optical signals into multiplexed switched optical signals at an output end of the optical switch. In effect, claim 19 is directed to an equalizer for carrying out the method of claim 15, written in means plus function form. The structure, material, or acts described in the specification that corresponds to the first means for controllably admitting individual switched optical signals from the multiplexed switched optical signals is the front end circuit described in the specification at p. 18, lines 1-8. In some embodiments, the front end circuit has wavelength-tunable optical bandpass filters connected to the outputs of optical splitters. (Specification, p. 18, lines 19-24; p. 30, lines 5-27; Figure 6, wavelength-tunable optical bandpass filters 610 connected to couplers 420 via optical paths 425). In other embodiments, the front end circuit is equipped with an optical switch matrix having a plurality of inputs respectively connected to a plurality of splitters and having a plurality of controllably

erectable mirrors, as well as a wavelength division multiplexer connected to an output of the switch matrix. (Specification, p. 18, lines 26-31; see Figure 4). Still other embodiments of the front end circuit are described at p. 19, lines 4-29 of the Specification. The structure, material, or acts described in the specification that corresponds to the second means, connected to the first means, for estimating the power of the admitted individual switched optical signals is the equalizer 500 (Figures 4-9), specifically the power estimation unit 530 in Figures 5-9 (see, e.g. Specification p. 28, line 14 through p. 29, line 10). The structure, material, or acts described in the specification that corresponds to the means, connected to the second means, for generating the control signals as a function of the power estimates and a reference value is a processor, such as processor 554 (Figure 5) described at p. 29, line 15 through p. 30, line 3, for running an equalization algorithm for processing the power estimates and generating control signals (see Specification, p. 39, line 23 through p. 44, line 10).

Claim 20 is directed to a switch for optical signals (see switch 400 of Figure 4). The claimed switch comprises:

a plurality of wavelength division demultiplexers, each having a demultiplexer input port and a plurality of demultiplexer output ports (see, e.g., Elements 110 of Figure 4)

a plurality of wavelength division multiplexers, each having a plurality of multiplexer input ports and a multiplexer output port (see, e.g., Elements 130 of Figure 4);

a plurality of optical splitters, each being connected to the multiplexer output port of a respective one of the wavelength division multiplexers (see, e.g., splitters 420 of Figure 4);

a switching core connected between the wavelength division demultiplexers and the wavelength division multiplexers, for providing an optical path from each demultiplexer output port to any one of a corresponding plurality of the multiplexer input ports (see, e.g., photonic switch core 150 of Figure 4);

a plurality of variable optical intensity controllers (VOICs) positioned in respective ones of the optical paths, each VOIC being arranged to control the intensity of a narrow-optical-bandwidth optical signal present in the respective optical path in accordance with a respective intensity control signal (see, e.g., VOICs 410 of Figure 4); and

an equalizer connected to the couplers and to the VOICs, for producing an estimate of the optical power of each narrow-optical-bandwidth optical signal after switching by the switching

core and for generating the intensity control signals as a function of the estimates of optical power (see, e.g. equalizer 500 of Figures 4-9).

Claim 58 recites a method of individually controlling the intensity of a plurality of optical carrier signals capable of being switched by a switching core and recombined into wavelength-division multiplexed (WDM) optical signals by a plurality of wavelength division multiplexers, comprising:

tapping a portion of each WDM optical signal after recombination by the multiplexers to produce a respective tapped optical signal (see tap coupler 1220 of Figure 12; p. 49, lines 1-7 and 20-27);

processing each tapped optical signal to produce an estimate of the power of each optical carrier signal contained in the respective WDM optical signal (power estimation module 1270 of Figure 12; p. 50, lines 15-27) and

adjusting the intensity of each optical carrier signal prior to recombination by the multiplexers as a function of the power estimates (see processor 1254 and VOICs 1210 of Figure 12; p. 50, line 2 though p. 51, line 11).

(6) GROUNDS OF REJECTION TO BE REVIEWED ON APPEAL

A. Whether claims 1, 15, 16, 19-22, and 58 were properly rejected under 35 U.S.C. § 103(a) as being unpatentable over U.S. Patent No. 6,559,984 to Lee et al. (hereinafter "Lee") in view of U.S. Patent No. 6,134,034 to Terahara (hereinafter "Terahara").

B. Whether claims 2, 3, 23, and 24 were properly rejected under 35 U.S.C. § 103(a) as being unpatentable over Lee in view of Terahara and further in view of U.S. Patent No. 6,049,413 to Taylor et al. (hereinafter "Taylor").

(7) ARGUMENT

A. Introduction

The Patent Office is improperly combining the references using hindsight to reconstruct the claimed invention using Appellant's disclosure as a template. In particular, the Patent Office has not provided any evidence to prove the motivation to combine the references. In addition,

even if combined, the proposed combination does not establish a *prima facie* case of obviousness because the combination does not teach or suggest each and every element of the claims.

B. Summary of the References

1. U.S. Patent No. 6,559,984 to Lee

Lee is directed to an optical path monitoring apparatus in an optical cross-connect system, the system including input ports, wavelength-division demultiplexers, optical switching devices, a control device, optical power regulating devices, wavelength-division multiplexers, and output ports. The monitoring apparatus includes a plurality of pilot tone superimposers, a plurality of optical splitters, and a plurality of pilot tone detectors. The monitoring aparatus monitors the optical path on the basis of the identification of input ports in the optical cross-connect system.

2. U.S. Patent No. 6,134,034 to Terahara

Terahara is directed to an optical communication system that provides stable transmission characteristics by controlling the total power and the power relativity of a WDM signal light. Terahara discloses that the WDM signal light includes a plurality of individual signal lights which each have a corresponding signal level, and that as it travels through the optical fiber, a coupler decouples a portion of the WDM signal light. A controller determines the spectrum of the WDM signal light from the decoupled portion and controls the power levels of the plurality of individual signal lights in accordance with the determined spectrum. More specifically, the controller can control the relative power levels of the individual signal lights with respect to each other. In addition, the controller can control the power levels of the individual signal lights to perform preeemphasis on the WDM signal light, and to obtain substantially equal signal to noise ratios of the individual signal lights as received by a receiver through the optical fiber.

3. U.S. Patent No. 6,049,413 to Taylor

Taylor is directed to an optical amplifier having substantially uniform spectral gain. The amplifier comprises a variable optical attenuator coupled between first and second segments of active optical fiber. The attenuation is adjusted in accordance with the optical power input to the amplifier to obtain substantially flattened gain. Alternatively, the attenuator can be controlled based on the respective gains associated with the first and second segments of optical fiber (e.g., adjusting the attenuator so that the sum of the two gains remains substantially constant yields flat spectral gain). Further, optical powers associated with first and second wavelengths of amplified

stimulated emission light output from the amplifier can be used to adjust the attenuation. In an additional example, received optical powers associated with each of the channels in a WDM system are monitored and the attenuators with each amplifier are controlled so that the received powers are substantially equal.

C. The Standards for Establishing Obviousness

Section 103(a) of the Patent Act provides the statutory basis for an obviousness rejection and reads as follows:

> A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

Courts have interpreted 35 U.S.C. § 103(a) as being a question of law based on underlying facts. As the Federal Circuit stated:

> Obviousness is ultimately a determination of law based on underlying determinations of fact. These underlying factual determinations include: (1) the scope and content of the prior art; (2) the level of ordinary skill in the art; (3) the differences between the claimed invention and the prior art; and (4) the extent of any proffered objective indicia of nonobviousness.

Monarch Knitting Mach. Corp. v. Sulzer Morat GmBH, 139 F.3d 877, 881 (Fed. Cir. 1998) (internal citations omitted).

The burden is on the Patent Office to establish a *prima facie* case of obviousness. *In re Fine*, 837 F.3d 1071, 1074 (Fed. Cir. 1988). "To reach a proper conclusion under § 103, the decisionmaker must step backward in time and into the shoes worn by [a person having ordinary skill in the art] when the invention was unknown and just before it was made." *Id.* at 1073 (quoting *Panduit Corp. v. Dennison Mfg. Co.*, 810 F.2d 1561, 1566 (Fed. Cir. 1987) (paraphrase in *Fine*'s original text)). "One cannot use hindsight reconstruction to pick and choose among isolated disclosures in the prior art to deprecate the claimed invention." *In re Fine* at 1075.

The "case law makes clear that the best defense against the subtle but powerful attraction of a hindsight-based obviousness analysis is rigorous application of the requirement for a showing of the teaching or motivation to combine prior art references." *In re Dembiczak*, 175

F.3d 994, 999 (Fed. Cir. 1999). "Combining prior art references without evidence of such a suggestion, teaching, or motivation simply takes the inventor's disclosure as a blueprint for piecing together the prior art to defeat patentability - the essence of hindsight." *Ibid.*

The Federal Circuit notes

> that evidence of a suggestion, teaching, or motivation to combine may flow from the prior art references themselves, the knowledge of one of ordinary skill in the art, or, in some cases, from the nature of the problem to be solves . . . The range of sources available, however, does not diminish the requirement for actual evidence. That is, the showing must be clear and particular. Broad conclusory statements regarding the teaching of multiple references, standing alone, are not "evidence."

Ibid (internal citations omitted). It is worth noting that the *Dembiczak* court specifically acknowledged *Fine*, but emphasized the requirement for actual evidence in proving the motivation to combine the references.

It is further worth noting that where the teachings of two or more prior art references conflict, the examiner must weigh the power of each reference to suggest solutions to one of ordinary skill in the art, considering the degree to which one reference might accurately discredit another. *In re Young*, 927 F.2d 588 (Fed. Cir. 1991); MPEP § 2143.01.

For a *prima facie* case of obviousness, the combination must teach or fairly suggest all the claim elements. *In re Royka*, 490 F.2d 981 (CCPA 1974); MPEP § 2143.03. If the Patent Office fails to establish obviousness, then the Appellant is entitled to a patent. *In re Glaug*, 283 F.3d 1335, 1338 (Fed. Cir. 2002).

D. Claims 1-3, 15, 16, 19-24, and 58 Are Non-Obvious Over Lee and Terahara

1. Claims 1-3, 15, 16, 19-24, and 58 Are Non-Obvious Over Lee and Terahara Claims Because the Combination of References is Improper

Claims 1, 15, 16, 19-22, and 58 were rejected under 35 U.S.C. § 103 as being unpatentable over Lee et al. (hereinafter "Lee") in view of Terahara et al. (hereinafter "Terahara"). Appellant respectfully traverses. For the Patent Office to combine references in an obviousness rejection, there must be some suggestion to combine the references. To establish a suggestion to combine the references, the Patent Office must do two things. First, the Patent Office must articulate a motivation to combine the references, and second, the Patent Office must support the articulated motivation with actual evidence. *In re Dembiczak*, 175 F.3d 994, 999

(Fed. Cir. 1999). The Federal Circuit has imposed the requirement to use actual evidence to help combat the powerful lure of hindsight reconstruction. *Id.* While acknowledging that the range of sources from which the Patent Office may find the evidence is broad, the Federal Circuit reiterated that the breadth of available sources does not diminish the requirement for actual evidence. *Id.*

The Patent Office has not properly supported the motivation to combine Lee and Terahara. Specifically, the Patent Office opines that the motivation to combine the references is ". . .to adjust the power level of each optical channel based on the detected power level of each plurality of attenuated optical signal so as to equalize the power in each of the plurality of optical channel." (Office Action of June 15, 2005, page 3, lines 19-22). This asserted motivation lacks the evidence required by the Federal Circuit. As such, the motivation to combine the references is improper. Since the motivation to combine the references is improper, there is no suggestion to combine the references. Since there is no suggestion to combine the references, the combination is improper. Since the combination is improper, and the references individually do not establish obviousness, the rejection is improper. Since the rejection is improper, the claims are allowable.

In response to Appellant's previous arguments that the Patent Office had not provided the required evidence to support the motivation to combine the references, the Patent Office responded in its Final Office Action by repeating its original motivation to combining the references and stating:

> . . .it must be recognized that any judgment on obviousness is in a sense necessarily a reconstruction based on hindsight reasoning. But so long as it takes into account only knowledge which was within the level of ordinary skill at the time the claimed invention was made, and does not include knowledge gleaned only from the applicant's disclosure, such a reconstruction is proper. See *In re McLaughlin*, 443 F.2d 1392, 170 USPQ 209 (CCPA 1971).

(Final Office Action of November 16, 2005, page 6, lines 1-6). In its Response to the Final Office Action, Appellent noted that the case law cited by the Patent Office is comparatively old and has been refined by the more recent decisions from the Federal Circuit (Response mailed January 10, 2006, p. 2). In particular, Appellant pointed out that in *Dembiczak*, the Federal Circuit specifically acknowledged that there was a wide range of sources from which the motivation to combine references could come, but stated that the range of available sources did

not diminish the requirement for actual evidence. *Dembiczak*, 175 F.3d at 999. In short, the Federal Circuit recognized that the temptation presented by hindsight was so great that to combat its subtle, but powerful lure, the Federal Circuit needed to impose an additional requirement on the Patent Office. That additional requirement is actual evidence. Thus, if the motivation comes from the knowledge of someone skilled in the art, the Patent Office may rely on that knowledge so long as the Patent Office can provide evidence to prove that the knowledge was available. In the absence of the actual evidence, broad assertions that the combination is obvious are not proper.

In the Advisory Action dated February 9, 2006, the Patent Office failed to acknowledge the Appellant's arguments regarding the Patent Office's failure to provide the actual evidence to support the stated motivation to combine required by *Dembiczak* or provide the requisite evidence. Instead, the Patent Office merely repeated *McLaughlin* for the assertion any judgment on obviousness is in a sense necessarily a reconstruction based on hindsight reasoning, and as long as it takes into account only knowledge which was within the level of ordinary skill at the time the claimed invention was made, and does not include knowledge gleaned only from the applicant's disclosure, such a reconstruction is proper. (advisory Action mailed February 9, 2006, p. 2) This ignores the holding by the Federal Circuit in *Dembiczak* which requires actual evidence to support the stated motivation to combine the references. To date the Patent Office has not presented __any__ evidence to prove the motivation to combine the references. Rather, it appears that the motivation comes from Appellant's disclosure and is improper. Since the motivation to combine the references is improper, the combination is improper. Since the combination is improper, the rejection is improper. Since the rejection is improper, the claims are allowable.

2. Claims 1-3, 15, 16, 19-24, and 58 Are Non-Obvious Over Lee and Terahara Because the Combination Does Not Teach or Suggest Each And Every Claim Element

Even if the combination is properly made, a point which Appellant does not concede, to establish *prima facie* obviousness, the Patent Office must show where each and every claim element is located in the combination. MPEP § 2143.03. The combination of Lee and Terahara does not establish *prima facie* obviousness of claims 1-3, 15, 16, 19-24, and 58 because certain elements are not shown.

For example, claim 1 recites a plurality of splitters each being connectable to an output of a respective one of the wavelength division multiplexers. The Patent Office has identified Lee element 540 as the multiplexers and element 536 as the splitter (Office Action mailed November 16, 2005, p. 2). However, element 536 is part of an optical power regulating device 530 (see Lee, col. 5, lines 20-23). As is readily seen in Lee, Figure 5A, element 530 is positioned in front of element 540, and thus, the element 536 is not connected to an output of the multiplexer as recited in the claim. Likewise, the Patent Office has identified Lee element 538 as the equalizer (Office Action mailed November 16, 2005, p. 3). The claim recites that the equalizer be connected to the splitter and the VOIC. As is readily seen in Lee, Figure 5C, element 538 is not connected to the splitter. Lee element 538 is connected to element 535 (which the Patent Office has identified as a VOIC) and element 537 (a photodiode, which the Patent Office has not used in the rejection). Lee's element 538 is clearly not connected to the element 536 and thus does not show the claimed arrangement.

In addition, the feedback controller 538 of Lee does not produce an estimate of optical power of each individual switched optical signal and generating the intensity control signals as a function of the estimates of optical power, as required by the claims of the present invention. In Lee, the optical variable attenuator 535 receives control signals and varies attenuation of optical power. A 1X2 coupler splits the optical signal passing through the attenuator 535. The split optical signal is converted to an electrical signal and the feedback controller 538 receives the electrical signal and provides a control signal that controls the attenuator 535. The attenuator 535 is controlled in proportion to the split input optical signal and therefore the optical power fluctuation in the input optical signal is reduced (Lee, col. 5, lines 37-51). There is no mention of the feedback controller 538 or any other device in Lee producing an estimate of optical power of each individual switched optical signal and generating the intensity control signals as a function of the estimates of optical power. Therefore, the feedback controller 538 does not teach or suggest the claimed equalizer for producing an estimate of optical power of each individual switched optical signal and generating the intensity control signals as a function of the estimates of optical power. Since Lee does not teach the element for which it is recited, the claims are allowable over Lee.

The Patent Office also admits that Lee does not specifically disclose that the optical variable attenuator (which the Examiner has equated to the claimed VOIC) is controlled by a

controller that is connected to an output of a WDM and to the optical variable attenuator (VOIC) (Office Action mailed November 16, 2005, p. 3). Appellant is not sure which element the Patent Office is admitting Lee does not teach. There is no claim that recites a controller that is connected to an output of a WDM and to the VOIC. Appellant addresses this issue here by assuming that the Patent Office is admitting that Lee does not teach or suggest the equalizer of claim 1, which recites an equalizer connected to the plurality of optical splitters and to the plurality of VOICs, for producing an estimate of optical power of each individual switched optical signal and generating the intensity control signals as a function of the estimates of optical power.

In an effort to supply what it admits is missing from Lee, the Patent Office cites to Figure 13 of Terahara as disclosing an optical power detector/controller 36 connected to an output of a WDM 18 through splitter 32 and to the optical variable attenuator (58-1, 58-2, 58-m) for equalizing the power of each of the plurality of wavelength (ch-1, ch-2, ch-m). However, the optical power detector/controller 36 of Terahara does not produce an estimate of optical power of each individual switched optical signal and generate the intensity control signals as a function of the estimates of optical power, as claimed in the present invention. The controller 36 of Terahara receives a result of monitoring by spectrum monitor 34 and produces control signals for all the channels so that the power relativity in the WDM signal light can be maintained constant at the output of the transmitting station. Together, the controller 36 and the spectrum monitor 34 determines the spectrum of the WDM signal light from a decoupled portion of the WDM signal light and controls bias currents of laser diodes 14 to control the power levels of the individual signal lights of the WDM signal light. More specifically, the relative power levels of the individual signal lights with respect to each other can be controlled. However, there is no mention of the controller 36 or any other device in Terahara producing an estimate of optical power of each individual switched optical signal and generating the intensity control signals as a function of the estimates of optical power. Therefore, the feedback controller 538 does not teach or suggest the claimed equalizer for producing an estimate of optical power of each individual switched optical signal and generating the intensity control signals as a function of the estimates of optical power. Therefore, neither Lee nor Terahara teach or suggest the claimed equalizer element for producing an estimate of optical power of each individual switched optical signal and generating the intensity control signals as a function of the estimates of optical power. Thus,

in combination, the two references do not teach or suggest the claim element. Since the combination does not teach the claim element, the combination does not establish obviousness. This provides an independent reason why the claims are allowable.

Claim 20 is directed to a switch and recites elements similar to those in claim 1, and is patentable for the same reasons set forth above with respect to claim 1.

Claims 15 and 19 deserve special mention. These claims are similar to claim 1 in that they both require estimating the power of the individual switched optical signals and generating the control signals as a function of the power estimates. However, the generating of the control signals in these claims is as a function of the power estimates **and** a reference value. As set forth above with respect to claim 1, Lee and Terahara, individually and in combination, fail to teach or suggest the estimating of the power of the individual switched optical signals and generating control signals as a function of the power estimates. Claims 15 and 19, having similar elements, are patentable over Lee and Terahara for the same reasons. In addition, the generating in claims 15 and 19 is a function of the power estimates **and** a reference value. The Patent Office has failed to make a *prima facie* case of obviousness as there has been no identification of anyplace in the prior art where the generation of control signals is a function of the power estimates **and** a reference value. Therefore, claims 15 and 19 are allowable for this separate reason.

Claim 58 also deserves special mention. Claim 58 recites a method of individually controlling the intensity of a plurality of optical carrier signals capable of being switched by a switching core and recombined into wavelength-division multiplexed (WDM) optical signals by a plurality of wavelength division multiplexers, comprising:

tapping a portion of each WDM optical signal after recombination by the multiplexers to produce a respective tapped optical signal;

processing each tapped optical signal to produce an estimate of the power of each optical carrier signal contained in the respective WDM optical signal; and

adjusting the intensity of each optical carrier signal prior to recombination by the multiplexers as a function of the power estimates.

The Patent Office lumped claim 58 in with claim 1 in its analysis. Claim 58 does recite steps similar to the power estimating and generating of control signals in claim 1 and therefore is allowable for the same reasons with respect to claim 1. However, as can be seen by looking at the claim language of claim 58, claim 58 also recites limitations that are different from those in

claim 1. For example, claim 58 requires tapping a portion of each WDM optical signal after recombination by the multiplexers and then processing the tapped optical signal to produce an estimate of the power of each optical carrier signal contained in the respective WDM optical signal. This is different from claim 1. The Patent Office has failed to point to any portion of Lee, Terahara, Taylor, or other prior art, that teaches or suggests tapping a portion of each WDM optical signal after recombination and then processing the tapped optical signal to produce an estimate of the power of each optical carrier signal contained in the respective WDM optical signal. Therefore, the Patent Office has failed to prove a *prima facie* case of obviousness with respect to claim 58. Accordingly, claim 58 is allowable for this separate reason.

3. Claims 2, 3, 23, and 24 Are Non-Obvious Over Lee and Terahara in View of Taylor

a. Claims 2, 3, 23, and 24 Are Non-Obvious Over Lee and Terahara in View of Taylor Because the Combination of References is Improper

Claims 2, 3, 23, and 24 were rejected under 35 U.S.C. § 103 as being unpatentable over Lee in view of Terahara, and further in view of Taylor et al. (hereinafter "Taylor"). Appellant respectfully traverses. The standard for establishing obviousness is set forth above.

Appellant initially traverses the rejection of claims 2, 3, 23, and 24 because the underlying combination of Lee and Terahara is improper as explained above. The Patent Office provides no new analysis as to why Lee would be combined with Terahara, so the combination of these two references remains improper. Since this combination is improper, this provides a first reason why claims 2, 3, 23, and 24 are allowable.

Appellant further traverses the rejection of claims 2, 23, 23, and 24 because the motivation to combine Taylor is improper. Specifically, the Patent Office opines that the motivation to combine Taylor into the system of Lee and Terahara is "...for adjusting or controlling the signal intensity so that the received powers are substantially equal." (Office Action of June 15, 2005, page 4, lines 19-21). Again, this motivation is not supported by the evidence that the Federal Circuit requires. As such, the motivation to combine the references is improper. Since the motivation to combine the references is improper, there is no suggestion to combine the references. Since there is no suggestion to combine the references, the combination is improper. Since the combination is improper, and the references individually do not establish

obviousness, the rejection is improper. Since the rejection is improper, this provides a second independent reason why the claims are allowable.

b. Claims 2, 3, 23, and 24 Are Non-Obvious Over Lee and Terahara in View of Taylor Because the Combination Does Not Teach or Suggest Each And Every Claim Element

Appellant also traverses the rejection of claims 2, 3, 23, and 24 because Taylor does not cure the deficiencies of Lee and Terahara regarding the arrangement of the splitter and the equalizer as claimed in claim 1 and 20. Nor does Taylor cure the deficiencies of Lee and Terahara with respect to failing to teach or suggest producing an estimate of optical power of each individual switched optical signal and generating the intensity control signals as a function of the estimates of optical power. Thus, even if properly combined, a point Appellant does not concede, the combination of Lee, Terahara, and Taylor does not teach and every element of claims 1 and 20. Since claims 2, 3, 23, and 24 depend from either claim 1 or claim 20, claims 2, 3 23, and 24 also have at least one element that is not taught or suggested by Lee, Terahara, or Taylor. Since none of the three references teach each and every limitation of the claims, the proposed combination does not establish obviousness, and this provides another reason why claims 2, 3, 23, and 24 are allowable.

E. Conclusion

Appellant requests reconsideration of the rejections in light of the arguments set forth above. The references are not properly combinable and the combination does not teach or suggest the claimed invention. Appellant earnestly solicits claim allowance at the Examiner's earliest convenience.

Respectfully submitted,
WITHROW & TERRANOVA, P.L.L.C.

By:

Benjamin S. Withrow
Registration No. 40,876
P.O. Box 1287
Cary, NC 27512
Telephone: (919) 654-4520

Date: May 4, 2006
Attorney Docket: 7000-431

CERTIFICATE OF TRANSMISSION

I HEREBY CERTIFY THAT THIS DOCUMENT IS BEING TRANSMITTED VIA FACSIMILE ON THE DATE INDICATED BELOW TO:

Examiner: Tran, Dzung D. Art Unit: 2638 Fax: 571-273-8300

Michelle Heymann
Name of Sender

Michelle Heymann
Signature

5-4-06
Date of Transmission

(8) APPENDIX

1. An optical intensity control system for use with an optical switch providing individual signal paths between a plurality of input ports and a plurality of output ports, said optical switch having a plurality of wavelength division multiplexers for combining sets of individual switched optical signals into multiplexed switched optical signals, the system comprising:

a plurality of optical splitters, each optical splitter being connectable to an output of a respective one of the plurality of wavelength division multiplexers;

a plurality of variable optical intensity controllers (VOICs) for insertion into respective ones of the individual signal paths and for individually controlling the intensity of optical signals present in said respective ones of the individual signal paths in accordance with respective intensity control signals; and

an equalizer connected to the plurality of optical splitters and to the plurality of VOICs, for producing an estimate of optical power of each individual switched optical signal and generating the intensity control signals as a function of the estimates of optical power.

2. The optical intensity control system as claimed in claim 1, wherein the equalizer comprises:

for each of the plurality of optical splitters, a wavelength division demultiplexer connected to an output of said optical splitter;

for each wavelength division demultiplexer, a plurality of optical receivers connected to said wavelength division demultiplexer;

for each of the plurality of optical receivers, a power estimator connected thereto; and

a common controller connected to each power estimator;

said common controller being adapted to read a power estimate from each power estimator and to generate said intensity control signals as a function thereof.

3. A system as claimed in claim 2, wherein each optical receiver is a narrow-optical-bandwidth optical receiver tuned to a single optical wavelength.

4. (Withdrawn) A system as claimed in claim 1, wherein the equalizer comprises:

a front end circuit having a plurality of inputs for receiving the multiplexed switched optical signals, the front end circuit being adapted to controllably isolate individual switched optical signals from the multiplexed switched optical signals;

an optical receiver unit connected to the front end circuit, for converting any isolated individual switched optical signals to electrical signals;

a power estimation unit connected to the optical receiver unit, for time-averaging the electrical signals, thereby to obtain respective estimates of optical power; and

a processor connected to the power estimated unit and to the front end circuit, the processor being adapted to cause the front end circuit to isolate selected individual switched optical signals, the processor being further adapted to generate the intensity control signals from the estimates of optical power.

5. (Withdrawn) A system as claimed in claim 4, wherein the front end circuit comprises, for each of the optical splitters, a wavelength-tunable optical bandpass filter connected to an output of said splitter;

wherein the processor is further adapted to selectably tune the filters in order to cause the selected individual switched optical signals to be isolated.

6. (Withdrawn) A system as claimed in claim 1, wherein the front end circuit comprises:

an optical switch matrix having a plurality of inputs respectively connected to the plurality of splitters and having a plurality of controllable erectable mirrors; and

a wavelength division demultiplexer connected to an output of said switch matrix;

wherein the processor is further adapted to selectably raise one mirror at a time on the optical switch matrix in order to cause selected individual switched optical signals to be isolated.

7. (Withdrawn) A system as claimed in claim 6, wherein the optical receiver unit comprises narrow-optical-bandwidth optical receivers each tuned to a single, distinct optical wavelength.

8. (Withdrawn) A system as claimed in claim 1, wherein the front end circuit comprises:

a first optical switch matrix having a plurality of inputs respectively connected to the plurality of splitters and having a plurality of controllably erectable mirrors;

a wavelength division demultiplexer connected to an output of said first switch matrix; and

at least one second optical switch matrix, each said second optical switch matrix having a plurality of inputs connected to the wavelength division demultiplexer and having a plurality of controllable erectable mirrors;

wherein the processor is further adapted to selectably raise one mirror at a time on the first optical switch matrix and to raise one mirror at a time on the at least one second optical switch matrix in order to cause selected individual switched optical signals to be isolated.

9. (Withdrawn) A system as claimed in claim 1, wherein the front end circuit comprises:

a first optical switch matrix having a plurality of inputs respectively connected to the plurality of splitters and having a plurality of controllable erectable mirrors;

a wavelength division demultiplexer connected to an output of said first switch matrix;

at least one second optical switch matrix, each said second optical switch matrix having a plurality of inputs connected to the wavelength division demultiplexer and having a plurality of controllably erectable mirrors; and

a coupler connected to an output of each second optical switch matrix;

wherein the processor is further adapted to selectably raise one mirror at a time on the first optical switch matrix and to raise one mirror at a time on the at least one second optical switch matrix in order to cause selected individual switched optical signals to be isolated.

10. (Withdrawn) A system as claimed in claim 1, wherein the front end circuit comprises:

an optical switch matrix having a plurality of inputs respectively connected to the plurality of splitters and having a plurality of controllably erectable mirrors; and

a wavelength-tunable optical bandpass filter connected to an output of said optical switch matrix;

wherein the processors is further adapted to selectably tune the filter and to selectably raise one mirror at a time on the optical switch matrix in order to cause selected individual switched optical signals to be isolated.

11. (Withdrawn) A system as claimed in claim 2, wherein the intensity control signals are produced sequentially as a time-division-multiplexed intensity control signal, the equalizer further comprising:

a demultiplexer having a data input and a control input both connected to the processor and having a plurality of outputs, for receiving the time-division-multiplexed intensity control signal at the data input for controllably distributing time-based portions of the time-division-multiplexed intensity control signal to selected ones of its outputs as a function of the signal received at its control input; and

a latching circuit having a plurality of inputs connected to the outputs of the demultiplexer, a plurality of outputs connected to the VOICs and a control input connected to the processor, for transferring the value at any one of its inputs to the corresponding output in response to the signal received at its control input and subsequently holding that value.

12. (Withdrawn) A system as claimed in claim 4, further comprising:

a reference path having a reference optical receiver connected in series with a reference power estimation unit, the reference power estimation unit having an output connected to the processor; and

a reference light source for controllably emitting light having a selectable wavelength, the output of the reference light source being coupled to each multiplexed switched optical signal at the input of the front end circuit and also being coupled to an input of the reference optical receiver.

13. (Withdrawn) A system as claimed in claim 12, wherein the reference light source is connected to the processor and wherein the processor is further adapted to:

obtain from the reference power estimation unit a reference estimate of the optical power of the reference light course while bypassing the front end circuit;

apply control to the front end circuit in order to obtain an estimate of the optical power of the reference light source for each combination of a multiplexed switched optical signal and a wavelength on that signal;

determine a calibration factor for each said combination by evaluating a function of the reference estimate and the power estimate corresponding to said combination; and

adjust the intensity control signal associated with each switched individual optical signal by the calibration factor associated with the particular combination of multiplexed switched optical signal and wavelength corresponding to that switched individual optical signal.

14. (Withdrawn) A system as claimed in claim 12, wherein said reference light source is tunable under control of the processor.

15. A method of generating control signals for adjusting intensity of single-carrier optical signals travelling through an optical switch adapted to recombine groups of switched optical signals into multiplexed switched optical signals at an output end of the optical switch, the method comprising the steps of:

(a) controllably isolating individual switched optical signals from the multiplexed switched optical signals;

(b) estimating the power of the individual switched optical signals isolated at step (a); and

(c) generating the control signals as a function of power estimates obtained at step (b) and a reference value.

16. The method as claimed in claim 15, further comprising adjusting each control signal as a function of a wavelength and the multiplexed switched optical signal associated with the corresponding isolated signal.

17. (Withdrawn) A method as claimed in claim 15, further comprising the steps of:

in advance of a connection map change affecting a subset of said single-carrier optical signals, generating control signals for gradually decreasing the intensity of the affected signals to a nominal value; and

following said connection map change, generating control signals for gradually increasing the intensity of the affected signals to the reference value.

18. (Withdrawn) A method as claimed in claim 15, further comprising the steps of:

in advance of a connection map change affecting a subset of said single-carrier optical signals, generating control signals for decreasing, to a nominal value, the intensity of the affected signals in groups thereof; and

following said connection map change, generating control signals for increasing, to the reference value, the intensity of the affected signals in groups thereof.

19. An equalizer for generating control signals used in adjusting the intensity of single-carrier optical signals travelling through an optical switch adapted to recombine groups of individual switched optical signals into multiplexed switched optical signals at an output end of the optical switch, the equalizer comprising:

first means for controllably admitting individual switched optical signals from the multiplexed switched optical signals;

second means, connected to the first means, for estimating the power of the admitted individual switched optical signals; and

means, connected to the second means, for generating the control signals as a function of the power estimates and a reference value.

20. A switch for optical signals, comprising:

a plurality of wavelength division demultiplexers, each having a demultiplexer input port and a plurality of demultiplexer output ports;

a plurality of wavelength division multiplexers, each having a plurality of multiplexer input ports and a multiplexer output port;

a plurality of optical splitters, each being connected to the multiplexer output port of a respective one of the wavelength division multiplexers;

a switching core connected between the wavelength division demultiplexers and the wavelength division multiplexers, for providing an optical path from each demultiplexer output port to any one of a corresponding plurality of the multiplexer input ports;

a plurality of variable optical intensity controllers (VOICs) positioned in respective ones of the optical paths, each VOIC being arranged to control the intensity of a narrow-optical-

bandwidth optical signal present in the respective optical path in accordance with a respective intensity control signal; and

an equalizer connected to the couplers and to the VOICs, for producing an estimate of the optical power of each narrow-optical-bandwidth optical signal after switching by the switching core and for generating the intensity control signals as a function of the estimates of optical power.

21. A switch as claimed in claim 20, wherein the VOICs are positioned between the switching core and the wavelength division multiplexers.

22. A switch as claimed in claim 20, wherein the VOICs are positioned between the wavelength division demultiplexers and the switching core.

23. A switch as claimed in claim 20, wherein the equalizer comprises:

for each of the optical splitters, a corresponding wavelength division demultiplexer connected to an output of said splitter;

for each wavelength division demultiplexer in the equalizer, a plurality of optical receivers connected to said demultiplexer;

for each optical receiver, a power estimator connected thereto; and

a common controller connected to each power estimator;

said controller being adapted to read a power estimate from each power estimator and to generate said intensity control signals as a function thereof.

24. A switch as claimed in claim 23, wherein each optical receiver is a narrow-optical-bandwidth optical receiver tuned to a single optical wavelength.

25. (Withdrawn) A switch as claimed in claim 20, wherein the equalizer comprises:

for each of the optical splitters, a corresponding wavelength-tunable optical bandpass filter connected to an output of said splitter;

for each filter, a corresponding wide-optical-bandwidth optical receiver connected thereto;

for each optical receiver, a corresponding power estimator connected thereto; and

a controller connected to the power estimators and to the filters;

said controller being adapted to selectably tune the filters, to read power estimates from the power estimators and to generate said intensity control signals as a function of the power estimates.

26. (Withdrawn) A switch as claimed in claim 20, wherein the equalizer comprises:

an optical switch matrix having a plurality of inputs respectively connected to the plurality of splitters and having a plurality of controllably erectable mirrors;

a wavelength division demultiplexer connected to an output of said switch matrix;

a plurality of optical receivers connected to said demultiplexer in the equalizer;

a plurality of power estimators respectively connected to the plurality of optical receivers; and

a controller being adapted to selectably raise one mirror at a time on the optical switch matrix, to read power estimates from the power estimators and to generate said intensity control signals as a function of the power estimators.

27. (Withdrawn) A switch as claimed in claim 26, wherein each optical receiver is a narrow-optical-bandwidth optical receiver tuned to a single optical wavelength.

28. (Withdrawn) A switch as claimed in claim 26, wherein the switching core comprises a plurality of core optical switching matrixes, each core optical switch matrix being associated with a distinct optical wavelength.

29. (Withdrawn) A switch as claimed in claim 28, wherein the switching core further comprises a wavelength-converting inner-matrix switch connected to the core optical switching matrices, for receiving optical signals from the core optical switching matrices, converting each received optical signal to electrical form and transmitting each converted signal at a changed wavelength to the core optical switch matrix associated with the changed wavelength.

30. (Withdrawn) A switch as claimed in claim 29, wherein at least one optical switch matrix in the equalizer is in a stacked relationship with respect to one or more core optical switch matrices.

31. (Withdrawn) A switch as claimed in claim 30, wherein at least one optical switch matrix in the equalizer is parallel to and aligned with one or more core optical switch matrices.

32. (Withdrawn) A switch as claimed in claim 20, wherein the equalizer comprises:

a first optical switch matrix having a plurality of inputs respectively connected to the plurality of splitters and having a plurality of controllably erectable mirrors;

a wavelength division demultiplexer connected to an output of said first switch matrix;

at least one second optical switch matrix, each said second optical switch matrix having a plurality of inputs connected to the wavelength division demultipexer in the equalizer and having a plurality of controllably erectable mirrors;

for each second optical switch matrix, a corresponding optical receiver connected to an output thereof;

for each optical receiver, a corresponding power estimator connected thereto; and

a controller connected to the power estimators, to the first optical switch matrix and to the at least one second optical switch matrix;

said controller being adapted to selectably raise one mirror at a time on the first optical switch matrix, to raise one mirror at a time on the at least one second optical switch matrix, to read power estimates from the power estimators and to generate said intensity control signals as a function of the power estimates.

33. (Withdrawn) A switch as claimed in claim 32, wherein the switching core comprises a plurality of core optical switching matrices, each core optical switch matrix being associated with a distinct optical wavelength.

34. (Withdrawn) A switch as claimed in claim 33, wherein the switching core further comprises a wavelength-converting inner-matrix switch connected to the core optical switching matrices, for receiving optical signals from the core optical switching matrices, converting each

received optical signal to electrical form and transmitting each converted signal at a changed wavelength to the core optical switch matrix associated with the changed wavelength.

35. (Withdrawn) A switch as claimed in claim 34, wherein at least one optical switch matrix in the equalizer is in a stacked relationship with respect to one or more core optical switch matrices.

36. (Withdrawn) A switch as claimed in claim 34, wherein at least one optical switch matrix in the equalizer is parallel to and aligned with one or more core optical switch matrices.

37. (Withdrawn) A switch as claimed in claim 20, wherein the equalizer comprises:

a first optical switch matrix having a plurality of inputs respectively connected to the plurality of splitters and having a plurality of controllably erectable mirrors;

a wavelength division demultiplexer connected to an output of said first switch matrix;

at least one second optical switch matrix, each said second optical switch matrix having a plurality of inputs connected to the wavelength division demultiplexer in the equalizer and having a plurality of controllably erectable mirrors;

a coupler connected to an output of each second optical switch matrix;

a wide-optical-bandwidth optical receiver connected to the coupler;

a power estimator connected to said optical receiver; and

a controller connected to the power estimator, to the first optical switch matrix and to the at least one second optical switch matrix;

said controller being adapted to selectably raise one mirror at a time on the first optical switch matrix, to raise one mirror at a time on the at least one second optical switch matrix, to read power estimates from the power estimator and to generate said intensity control signals as a function of the power estimates.

38. (Withdrawn) A switch as claimed in claim 37, wherein the switching core comprises a plurality of core optical switching matrices, each core optical switch matrix being associated with a distinct optical wavelength.

39. (Withdrawn) A switch as claimed in claim 38, wherein the switching core further comprises a wavelength-converting inter-matrix switch connected to the core optical switching matrices, for receiving optical signals from the core optical switching matrices, converting each received signal to electrical form and transmitting each converted signal at a changed wavelength to the core optical switch matrix associated with the changed wavelength.

40. (Withdrawn) A switch as claimed in claim 39, wherein at least one optical switch matrix in the equalizer is in a stacked relationship with respect to one or more core optical switch matrices.

41. (Withdrawn) A switch as claimed in claim 39, wherein at least one optical switch matrix in the equalizer is parallel to and aligned with one or more core optical switch matrices.

42. (Withdrawn) A switch as claimed in claim 20, where the equalizer comprises:

an optical switch matrix having a plurality of input respectively connected to the plurality of splitters and having a plurality of controllably erectable mirrors;

a wavelength-tunable optical bandpass filter connected to an output of said optical switch matrix;

a wide-optical-bandwidth optical receiver connected to said filter;

a power estimator connected to said optical receiver; and

a controller connected to the power estimator, to the filter and to the optical switch matrix;

said controller being adapted to selectably tune the filter, to selectably raise one mirror at a time on the optical switch matrix, to read power estimates from the power estimator and to generate said intensity control signals as a function of the power estimates.

43. (Withdrawn) A switch as claimed in claim 42, wherein the switching core comprises a plurality of core optical switching matrices, each core optical switch matrix being associated with a distinct optical wavelength.

44. (Withdrawn) A switch as claimed in claim 43, wherein the switching core further comprises a wavelength-converting inter-matrix switch connected to the core optical switching matrices, for receiving optical signals from the core optical switching matrices, converting each received signal to electrical form and transmitting each converted signal at a changed wavelength to the core optical switch matrix associated with the changed wavelength.

45. (Withdrawn) A switch as claimed in claim 44, wherein at least one optical switch matrix in the equalizer is in a stacked relationship with respect to one or more core optical switch matrices.

46. (Withdrawn) A switch as claimed in claim 44, wherein at least one optical switch matrix in the equalizer is parallel to and aligned with one or more core optical switch matrices.

47. (Withdrawn) A switch as claim in claim 20, further comprising:

a plurality of second VOICs, each connected between the multiplexer output port of a respective one of the wavelength division multiplexers and the corresponding splitter, for controlling the intensity of multiplexed switched optical signal exiting the wavelength division multiplexers in accordance with a respective second intensity control signals;

wherein the equalizer is further adapted to generate the second intensity control signals as a function of the power estimates.

48. (Withdrawn) A switch as claimed in claim 20, further comprising:

a plurality of second VOICs, each connected to the demultiplexer input port of a respective one of the wavelength division demultiplexers connected to the switching core, the second VOICs being arranged to control the intensity of multiplexed switched optical signals entering the wavelength division demultiplexers in accordance with respective second intensity control signals;

wherein the equalizer is further adapted to generate the second intensity control signals as a function of the power estimates.

49. (Withdrawn) A switch as claimed in claim 20, further comprising:

a plurality of second optical splitters, each being optically connected to the demultiplexer input port of a respective one of the wavelength division demultiplexers and being arranged to tap a fractional amount of light carrying a respective unswitched wavelength division multiplexed signal;

a plurality of second VOICs, each being optically connected between a respective second optical splitter and the corresponding wavelength division demultiplexer and being arranged to control the intensity of the respective unswitched wavelength division multiplexed signal in accordance with a respective second intensity control signal; and

a wide-optical-bandwidth power estimation unit connected to the second optical splitters, for estimating the average optical power of the unswitched wavelength division multiplexed signals;

wherein the equalizer is adapted to generate the second intensity control signals as a function of the power estimates received from the wide-optical-bandwidth power estimation unit.

50. (Withdrawn) A switch as claimed in claim 20, further comprising:

a plurality of second VOICs, each being optically connected to the demultiplexer input port of a respective one of the wavelength division demutiplexers and being arranged to control the intensity of a respective unswitched wavelength division multiplexed signal in accordance with a respective second intensity control signal;

a plurality of second optical splitters, each being optically connected between a respective one of the second VOICs and the corresponding wavelength division demultiplexer and being arranged to tap a fractional amount of light carrying the respective unswitched wavelength division multiplexed signal; and

a wide-optical-bandwidth power estimation unit connected to the second optical splitters, for estimating the average optical power of the unswitched wavelength division multiplexed signals;

wherein the equalizer is adapted to generate the second intensity control signals as a function of the power estimates received from the wide-optical-bandwidth power estimation unit.

51. (Withdrawn) A switch as claimed in claim 50, further comprising:

a reference optical path comprising a reference optical receiver connected in series with a reference power estimation unit, the reference power estimation unit having an output connected to the processor; and

a reference light source having an output coupled to each unswitched wavelength division multiplexed signal at the input of the wide-optical-bandwidth power estimation unit and also being coupled to an input of the reference optical receiver.

52. (Withdrawn) A system as claimed in claim 51, wherein the reference light source is connected to the processor by a control link and wherein the processor is further adapted to:

obtain from the reference power estimation unit a reference estimate of the optical power of the reference light source;

apply control to the wide-optical-bandwidth power estimation unit in order to obtain an estimate of the optical power of each unswitched wavelength division multiplexed signal;

determine a calibration factor for each unswitched wavelength division multiplexed signal by evaluating the function of (I) the reference estimate and (II) the power estimate of the unswitched wavelength division multiplexed signal; and

adjust the second intensity control signal associated with each unswitched wavelength division multiplexed signal by the associated calibration factor.

53. (Withdrawn) A switch as claimed in claim 20, wherein the equalizer comprises:

a front end circuit having a plurality of inputs for receiving the multiplexed switched optical signals, the front end circuit being adapted to controllably admit individual switched optical signals from the multiplexed optical signals;

an optical receiver unit connected to the front end circuit, for converting any admitted individual switched optical signals to electrical signals;

a power estimation unit connected to the optical receiver unit, for time-averaging the electrical signals, thereby to obtain respective estimates of optical power; and

a processor connected to the power estimation unit and to the front end circuit, the processor being adapted to cause the front end circuit to admit selected individual switched optical signals, the processor being further adapted to generate the intensity control signals from the estimates of optical power.

54. (Withdrawn) A switch as claimed in claim 53, wherein the intensity control signals are produced sequentially as a time-division-multiplexed intensity control signal, the equalizer further comprising:

a demultiplexer having a data input and a control input both connected to the processor and having a plurality of outputs, for receiving the time-division-multiplexed intensity control signal at the data input and for controllably distributing time-based portions of the time-division-multiplexed intensity control signal to selected ones of its outputs as a function of the signal received at its control input; and

a latching circuit having a plurality of inputs connected to the outputs of the demultiplexer, a corresponding plurality of outputs connected to the VOICs and a control input connected to the processor, for transferring the value at any one of its inputs to the corresponding output in response to the signal received at its control input and subsequently holding that value.

55. (Withdrawn) A switch as claimed in claim 53, further comprising:

a reference path having a reference optical receiver connected in series with a reference power estimation unit, the reference power estimation unit having an output connected to the processor; and

a reference light source for controllably emitting light having a selectable wavelength, the output of the reference light source being coupled to each multiplexed optical signal at the input of the front end circuit and also being coupled to an input of the reference optical receiver.

56. (Withdrawn) A switch as claimed in claim 55, wherein the reference light source is connected to the processor and wherein the processor is further adapted to:

obtain from the reference power estimation unit a reference estimate of the optical power of the reference light source without the effect of the front end circuit;

apply control the to front end circuit in order to obtain an estimate of the optical power of the reference light source for each combination of a multiplexed switched optical signal and a wavelength on that signal;

determine a calibration factor for each said combination by evaluating a function of the reference estimate and the power estimate corresponding to said combination; and

adjust the intensity control signal associated with each switched individual optical signal by the calibration factor associated with the particular combination of multiplexed switched optical signal and wavelength corresponding to that switched individual optical signal.

58. A method of individually controlling the intensity of a plurality of optical carrier signals capable of being switched by a switching core and recombined into wavelength-division multiplexed (WDM) optical signals by a plurality of wavelength division multiplexers, comprising:

tapping a portion of each WDM optical signal after recombination by the multiplexers to produce a respective tapped optical signal;

processing each tapped optical signal to produce an estimate of the power of each optical carrier signal contained in the respective WDM optical signal; and

adjusting the intensity of each optical carrier signal prior to recombination by the multiplexers as a function of the power estimates.

(9) EVIDENCE APPENDIX

Appellant relies on no evidence, thus this appendix is not applicable.

(10) RELATED PROCEEDINGS APPENDIX

As there are no related proceedings, this appendix is not applicable.